

30. (Unchanged) The method according to claim 26, wherein the cleaning composition is applied to a rotating polishing pad for about 3 seconds to about 20 seconds.

31. (Unchanged) The method according to claim 26, further comprising rinsing the polishing pad surface with water to remove any cleaning composition on the polishing surface.

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33. (Added) The method according to claim 2, further comprising:
rinsing the polishing pad surface with water.

REMARKS

This is intended as a full and complete response to the Office Action dated December 18, 2002, having a shortened statutory period for response set to expire on March 18, 2003. Please reconsider the claims pending in the application for reasons discussed below.

Claims 1-18 and 26-32 are pending in the application. Applicants have amended claims 4-5, 15-16, 26, and 28 to more clearly recite the claimed aspect of the invention, to merely restate elements already present in the claims, to make explicit what was inherent, to properly recite a method and method steps, and to place claims in condition for allowance. Since no narrowing amendments have been made herein, Applicants believe that the claims are entitled to the full scope of equivalents. In addition, it is believed that the amendments are supported by the specification and no new matter has been introduced.

Applicants have cancelled claim 32 without prejudice. Applicants reserve the right to pursue the subject matter of claim 32 at a later date. Cancellation of claim 32 is not a concession that the claim is not patentable, but rather reflects applicants' decision to pursue the subject matter of claims 1-18 and 26-31. Applicants present claim 33 for consideration by the Examiner.

Claims 26-32 stand rejected under 35 U.S.C. 112, first paragraph. The Examiner states that the specification, while being enabling for a method of cleaning a polishing pad, does not reasonably provide enablement for generalized “cleaning” and the claims are currently drawn to a method of cleaning.

Applicants have amended claim 26 and claims dependent therefrom to include “a surface of a polishing pad”. Applicants have cancelled claim 32 without prejudice and respectfully submit that amended claims 26-31, drawn to a method of cleaning a surface of a polishing pad, are supported by the specification and should be in condition for allowance. Accordingly, applicants respectfully request allowance of claims 26-31. It should be noted that the claim amendments merely restate elements already present in the claims and/or make explicit what was inherent. Since no narrowing amendments have been made herein, Applicants believe that the claims are entitled to the full scope of equivalents.

Claims 4 and 15 stand rejected under 35 U.S.C. 112, first paragraph. Applicants have amended claims 4 and 15 to include the pH range of about 8 to 11. Applicants respectfully submit that amended claims 5 and 15 are supported by the specification at least at page 4, lines 23-28, and page 6, lines 8-11 and no new matter has been introduced in the claims. Accordingly, applicants respectfully request allowance of claims 4 and 15.

Claims 26-32 stand rejected under 35 U.S.C. 112, second paragraph. The Examiner states that claim 26 recites a method for cleaning, but fails to recite cleaning steps.

Applicants have amended claim 26 and claims dependent therefrom to include the step of “cleaning the polishing pad surface with the cleaning composition”. In addition, Applicants have cancelled claim 32 and reserve the right to pursue the subject matter of cancelled claim 32 at a later date. Applicants respectfully submit that claims 26-31, as amended, properly recite a cleaning step for a method of cleaning a surface of a polishing pad, are supported by the specification, and should be in condition for allowance. Accordingly, applicants respectfully request allowance of claims 26-31.

Claims 4, 5, and 15 stand objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim.

Applicants have amended claims 4 and 15 as discussed above to obviate the objection. Applicants respectfully request allowance of claims 4 and 15.

With respect to claim 5, the Examiner states that it was not clear what additional method steps were contemplated. Applicants have amended claim 5 to recite "the organic compound of the cleaning composition interacts with by-products of the Cu and/or Cu-based alloy generated during CMP to form at least one complex that is soluble in water, and the polishing pad surface is rinsed with water to remove the at least one complex". Applicants respectfully submit that amended claim 5 properly recites method steps to include elements already present in the claims and/or make explicit what was inherent, and should be in condition for allowance. Since no narrowing amendments have been made herein, Applicants believed that it is entitled to the full scope of equivalents. In addition, it is believed that no new matter has been introduced in the claim and the amendments are supported by the specification at least at page 5, lines 26-32, page 6, lines 1-4, and page 6, lines 24-29. Accordingly, applicants respectfully request allowance of claims 5.

Claim 32 stands objected to under 37 CFR 175(c), as being of improper dependent form. Applicants have cancelled claim 32 and reserve the right to pursue the subject matter of cancelled claim 32 at a later date. Cancellation of claim 32 is not a concession that the claim is not patentable, but rather reflects applicants' decision to pursue the subject matter of claims 1-18 and 26-31.

Claims 1-4, 8, 12-16, and 27-28 stand rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent No. 5,981,454 to *Small et al.* The Examiner states that *Small et al* discloses a method of cleaning a polishing pad comprising applying to the polishing pad surface a cleaning composition comprising a composition that has an amine concentration that includes at least one endpoint of the claimed range. The Examiner also states that *Small et al.* further discloses an acid or base such that the composition has a pH of between 3.5 and 7. Applicants respectfully traverse this rejection.

Small et al. discloses a method of cleaning a wafer with a post clean treatment composition to remove chemical residues from metal or dielectric surfaces of the wafer. The post clean treatment composition of *Small et al.* is for cleaning a wafer. Therefore,

Applicants respectfully disagree with the Examiner and point out that *Small et al.* does not teach, show, or suggest cleaning a polishing pad surface as recited in claims 1, 12, 26, and claims dependent therefrom.

In addition, *Small et al.* discloses a method of chemical mechanical polishing a copper surface from a wafer by supplying a post clean treatment composition to the copper surface and polishing the copper surface in the presence of the post clean treatment composition. The post clean treatment composition of *Small et al.* is for polishing a copper surface of a wafer. Therefore, Applicants respectfully disagree with the Examiner and point out that *Small et al.* does not teach, show, or suggest a method of cleaning a polishing pad surface as recited in claims 1, 12, 26, and claims dependent therefrom.

Further, the post clean treatment composition of *Small et al.* is for either removing chemical residues from metal or dielectric surfaces of a wafer or for polishing a copper surface of a wafer. *Small et al.* does not teach, show, or suggest applying a cleaning composition to a polishing pad surface as recited in claims 1, 12, 26, and claims dependent therefrom. Accordingly, applicants respectfully request allowance of claims 1, 12, 26, and claims dependent therefrom.

Claims 5-7, 9-11, 17-18 and 29-32 stand rejected under 35 USC 103(a) as being obvious over *Small et al.* in view of United States Patent No. 6,280,299 to *Kennedy et al.* The Examiner states that each and every limitation of claims 6, 7, 9, 10, 11, 17 and 18 are identically disclosed in *Small et al.*, except that *Small et al.* fails to explicitly disclose applying the solution to a rotating polishing pad at a flow rate of about 10 to 600 ml/min. The Examiner also states that *Kennedy et al.* discloses using a flowrate between 230 and 6000 ml/min (e.g., column 6, line 58 et seq.). Applicants respectfully traverse this rejection.

The teachings of *Small et al.* have been discussed above. *Small et al.* does not teach, show, or suggest a method of cleaning a polishing pad surface, nor does *Small et al.* teach, show, or suggest applying to the polishing pad surface a cleaning composition, as recited in claims 1, 12, 26, and claims dependent therefrom.

In addition, *Small et al.* does not teach, show, or suggest a cleaning composition for cleaning a polishing pad surface, as recited in claims 1, 12, 26, and claims

dependent therefrom. Further, as the Examiner points out *Small et al.* does not teach, show, or suggest applying a cleaning composition to a rotating polishing pad at a flow rate of about 100 ml/min to about 600 ml/min, as recited in claims 6-7, 17-18, and 29-30.

Still further, *Small et al.* discloses rinsing metal or dielectric surfaces of a wafer or rinsing a copper surface of a wafer. *Small et al.* does not teach, show, or suggest rinsing a polishing pad surface, as recited in claims 5-7, 9-11, 17-18, and 29-32. Still further, *Small et al.* does not teach, show, or suggest removing any surface coating materials from the wafer surface before applying the cleaning composition to the polishing pad surface, as recited in claim 10. Still further, *Small et al.* does not teach, show, or suggest conditioning the polishing pad surface before, during and after applying the cleaning solution, as recited in claim 11. Therefore, the combination of *Small et al.* with any reference cannot serve as a basis for rejection.

Kennedy et al. discloses a method and apparatus for delivering one or more rinse agents, preferably one or more polishing fluids, to a polishing pad surface or a substrate surface. *Kennedy et al.* further discloses a method of cleaning one or more surfaces, such as a polishing pad surface and a substrate surface, by delivering a spray of one or more rinse agents to the surface and, preferably, causing the rinse agent to flow across the surface from a central region to an outer region where unwanted debris and material is collected.

Kennedy et al. does not teach, show, or suggest a cleaning composition as recited in claims 1, 12, 26, and claims dependent therefrom, nor does *Kennedy et al.* teach, show, or suggest applying such a cleaning composition to a polishing pad surface as recited in claims 1, 12, 26, and claims dependent therefrom.

Therefore, both references fail to teach, show, or suggest applying to a polishing pad surface a cleaning composition including about 0.1 to about 3.0 wt.% of at least one organic compound containing one or more amine or amide groups, an acid or a base in an amount such that the composition has a pH of about 5.0 to about 12.0, and water, as recited in claims 1, 12, 26, and claims dependent therefrom. The combination of *Kennedy et al.* with *Small et al.* does not teach, show or suggest all claimed limitations as required for establishing *prima facia* obviousness. (MPEP 2143.03) Claims 5-7, 9-11, 17-1, and 29-32 depend from claims 1, 12, and 26, and are therefore patentable for

the same reasons as claims 1, 12, and 26. In addition, there is no motivation existed to combine the post clean treatment composition of *Small et al.*, which is for cleaning a wafer or polishing a wafer, to a polishing pad surface. Accordingly, withdrawal of the rejection is respectfully requested.

In conclusion, the references cited by the Examiner, neither alone nor in combination, teach, show, or suggest the claimed aspect of the invention. Having addressed all issues set out in the office action, Applicants respectfully submit that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,



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VERSION WITH MARKSINGS TO SHOW CHANGES MADE

4. (Twice Amended) The method according to claim 1, wherein the composition is a solution having a pH of about 8 [5.0] to about 11 [10.0].

5. (Twice Amended) The method according to claim 2, wherein[:]the organic compound of the cleaning composition interacts with by-products of the Cu and/or Cu-based alloy [containing by-products are] generated during CMP [on the polishing pad surface; the organic compound] to form[s] at least one complex that is soluble in water, [with the Cu and/or Cu-containing by-products generated during CMP;] and [the at least one complex is (are) dissolved in the water]the polishing pad surface is rinsed with water to remove the at least one complex.

15. (Twice Amended) The method according to claim 12, wherein the composition is a solution having a pH of about 8 [5.0] to about 11 [10.0].

16. (Twice Amended) The method according to claim12, wherein[:]the organic compound of the cleaning composition interacts with by-products of the Cu and/or Cu-based alloy [containing by-products are] generated during CMP [on the surface of the polishing pad; the at least one organic compound] to form[s] at least one complex [with the Cu and/or Cu-containing by-products;]that is soluble in water, and the at least one complex is [(are) dissolved in the water; and the cleaning composition containing the dissolved complexes are] removed during rinsing.

26. (Amended) A method of cleaning a surface of a polishing pad, comprising:
conducting chemical-mechanical polishing (CMP) on a first wafer on the [a] surface of the [a] polishing pad;

removing the first wafer from the polishing pad; and
applying to the polishing pad surface a cleaning composition, wherein the cleaning composition further comprises:

about 0.1 to about 3.0 wt.% of at least one organic compound containing one or more amine or amide groups;

an acid or a base in an amount such that the composition has a pH of about 5.0 to about 12.0; and

water; and

cleaning the polishing pad surface with the cleaning composition.

28. (Amended) The method according to claim 26, wherein the cleaning composition is a solution having a pH of about 8 [5.0] to about 11 [10.0].